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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/082,009	02/20/2002	Tsu Shih	67,200-646	1899

7590 09/17/2004

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EXAMINER

MARKOFF, ALEXANDER

ART UNIT	PAPER NUMBER
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1746

DATE MAILED: 09/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/082,009

Applicant(s)

SHIH ET AL.

Examiner

Alexander Markoff

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 6/16/04.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12, 14 and 16-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12, 14 and 16-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1-9 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The applicants amended the claims to recite, "preventing photo-induced chemical attack on a copper oxide containing surface". This is not supported by the original disclosure. The original disclosure teaches preventing the "attack" on copper, not the copper oxide. The copper oxide is dissolved during the cleaning process. See at least page 7 of the specification wherein the purpose of the cleaning step is disclosed. The method of the original disclosure prevents the "attack" on copper (erosion of copper) in post-CMP cleaning. Preventing the "attack" on copper oxide is not supported by the original disclosure.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 1-12, 14 and 16-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edelstein et al (any of US Patents 6,251,787 and 6,153,043) in view of Obeng et al (US Patent No 6,323,131), Zhang et al (US Patent No 6,162,301) and Kneer (US Patent No 6,147,002).

Edelstein et al teach a method for elimination of photo-induced corrosion and dissolution of exposed copper in CMP and post-CMP processing by shielding the processing from the light. The document disclosed shielding the light in CMP, brush

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cleaning, rinsing, etc. The document discloses the claimed wavelength with the sufficient specificity by disclosure the range less than about 900 nm. The document teaches that the method works in presence of electrolytes.

See entire documents, especially, Abstract and Description of the Preferred Embodiments.

Thus, Edelstein et al teach a method as claimed except for specific recitation of the acidic cleaning solution and the specific pH of the solution.

The secondary references all teach that conventional cleaning solutions used in conventional steps of post-CMP cleaning of structures with exposed copper are acidic and have the claimed pH. The documents disclose the use of these solutions in immersing, rinsing, brush cleaning, etc., i.e. in the steps disclosed by Edelstein et al.

It would have been obvious to an ordinary artisan at the time the invention was made to apply the method of Edelstein et al on the processes of post-CMP cleaning, which utilized conventional cleaning solutions disclosed by Obeng et al, Zhang et al and Kneer with reasonable expectation of success in order to prevent etching, dissolution and corrosion of the exposed copper surfaces.

Response to Arguments

5. Applicant's arguments filed 6/16/04 have been fully considered but they are not persuasive.

The applicants argue that Obeng et al do not teach acidic cleaning solution.

This is not persuasive because at least at column 4, lines 26-30 the document teaches that standard post CMP cleaning of copper layer comprises treatment with acidic solution with pH ~4.

The applicants admitted that Zhang et al teach an acidic solution for post-CMP cleaning of copper, but argue that there is no teaching in the document that the acid cleaning solution may act as an electrolyte.

This is not persuasive because being electrolyte is a property of the acidic solution. Any acidic solution is ionized when dissolved. The term electrolyte means a chemical compound that ionizes when dissolved or molten to produce an electrically conductive medium.¹

The applicants argue that Kneer teaches away from invention of Edelstein et al because it teaches slightly etching of copper by the cleaning solution.

This is not persuasive because the secondary references were cited to show that post-CMP cleaning of copper with acidic solutions was conventional in the art.

In contrast to the applicants arguments, the fact that Kneer teaches that the cleaning solution slightly etches the copper provides motivation to apply the method of Edelstein et al on the processes of conventional post-CMP cleaning, which utilized conventional cleaning solutions disclosed by Obeng et al, Zhang et al and Kneer with reasonable expectation of success in order to prevent etching and dissolution of the

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exposed copper surfaces. This is because Edelstein et al teach how to prevent such dissolution and etching during CMP and post-CMP processing.

It is noted that the applicants admitted in the specification that post-CMP cleaning of copper with acidic solutions and dissolution of copper by these solutions were known and conventional in the art. See at least page 7 of the disclosure.

Edelstein et al teach how to reduce the dissolution during CMP and post-CMP processing. It would have been obvious to an ordinary artisan at the time the invention was made to apply the method of Edelstein et al on the processes of conventional post-CMP cleaning, which utilized conventional cleaning solutions disclosed by Obeng et al, Zhang et al and Kneer.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

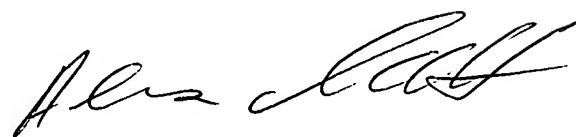
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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander Markoff whose telephone number is 571-272-1304. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on 571-272-1414. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Alexander Markoff
Primary Examiner
Art Unit 1746

am

ALEXANDER MARKOFF
PRIMARY EXAMINER